ITEM 66 FY93
04DS31
01 June 1991

PURCHASE DESCRIPTION

SIGNAL GENERATOR (50 MHz to 8 GHz)

FSNSF-F

1.0 GENERAL This procurement requires a stable microwave signal generator capable of generating signals over the frequency range of 50 MHz to 8 GHz with internal and external modulation capabilities.

2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800( ), Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:

a. The Electromagnetic Interference requirements of MIL-T-28800( ) are limited to CE03, CS01, CS02 (0.05 to 100 MHz), CS06, RE02 (14 kHz to 10 GHz), and RS03.

b. The warm-up time is extended to one hour.

3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency Characteristics

3.1.1 Range: At least 50 MHz to 8 GHz

3.1.2 Resolution: At least 1 kHz; digital readout

3.1.3 Accuracy: Equal to reference standard (CW mode)

3.1.4 Stability (equal to or better than limits specified below)

3.1.4.1 Internal: Less than 1 part in 10^9/h at 25˚C ±5˚C after one hour warmup
3.1.4.2 External: Equal to external standard
3.1.4.3 Temperature: Less than ±2 parts in 10^5 change over 0 to 50˚C

3.1.5 Residual Modulation (CW mode in 50 Hz to 15 kHz detection BW)

3.1.5.1 FM: Less than 150 Hz rms
3.1.5.2 AM: Less than 0.15% pk

3.1.6 Spectral Purity {F = carrier frequency}

3.1.6.1	Harmonics: < -30 dBc	
3.1.6.2	Power line/Fan rotation related harmonics: < -30 dBc	(< 1 kHz from carrier)
3.1.6.3	Non-harmonics/Spurious: < -55 dBc	(≥ 10 kHz from carrier)
3.1.6.4	Phase Noise: < -80 dBc/Hz	(10 kHz offset from carrier)

3.2 Output Characteristics

3.2.1 Range: +10 to -90 dBm leveled (minimum)

3.2.2 Accuracy: ±2.0 dB for output levels from +10 dBm to -50 dBm; additional 0.1 dB/10 dB step for levels below -50 dBm

3.2.3 Display/Resolution: Digital display; minimum resolution of 0.1 dB

3.2.4 Flatness: ±1.0 dB measured at an output level of +10 dBm

3.2.5 Impedance/Connector: 50 ohms; type-N female connector

3.2.5.1 VSWR: < 2:1 [Level ≤ 0 dBm]

3.2.6 Reverse Power Protection: The generator shall be capable of accepting the following signal levels at its output connector without resulting damage.

3.2.6.1 Average Power: 1 watt
3.2.6.2 Peak Power: 2 kW [2.3 GHz < F < 8.0 GHz]

3.3 Modulation Characteristics

3.3.1 Pulse Modulation

3.3.1.1 Internal
3.3.1.1.1 Rate (PRF): 50 Hz to 50 kHz
3.3.1.1.2 Width (PW): 0.1 to 10.0 µs
3.3.1.1.3 Rise/Fall Times: < 50 ns
3.3.1.1.4 ON/OFF Ratio: ≥ 80 dB
3.3.1.1.5 Delay: 50 nsec to 100 ms
3.3.1.1.5.1 Accuracy: ≤ 20% of setting
3.3.1.1.5.2 Sync Pulse Output: TTL compatible; rise time less than 50 ns
3.3.1.1.5.3 Video Pulse Output: TTL compatible; width corresponds to PW control setting
3.3.1.1.6 External Trigger Input: TTL compatible; at least 100 Hz to 50 kHz; provides sync rate for pulse modulation

3.3.1.2 External
3.3.1.2.1 Rate (PRF): 50 Hz to 50 kHz
3.3.1.2.2 Width (PW): > 0.1 µs
3.3.1.2.3 Video Output: TTL compatible pulse; same PW and PRF as external input pulse
3.3.1.2.4 Pulse Input: TTL compatible

3.3.2 Amplitude (Can be used simultaneously with pulse modulation}
3.3.2.1 Internal AM
3.3.2.1.1 Rate: At least 400 Hz and 1 kHz
3.3.2.1.2 Depth: 0 to 70% minimum
3.3.2.1.3 Accuracy: less than 10%
3.3.2.2 External AM
3.3.2.2.1 Rate: At least 10 Hz to 10 kHz
3.3.2.2.2 Depth: 0 to 70% minimum
3.3.2.2.3 Sensitivity: At least 70%/V

3.3.3 Frequency Modulation (FM) {F = carrier freq; ΔF = peak freq deviation}

3.3.3.1 Internal FM
3.3.3.1.1 Rate: At least 400 Hz and 1 kHz
3.3.3.1.2 FM Deviation:
≤ 1 kHz to at least 100 kHz peak [50 MHz ≤ F ≤ 500 MHz]
≤ 1 kHz to at least 1 MHz peak [500 MHz ≤ F ≤ 1 GHz]
≤ 1 kHz to at least 2 MHz peak [F ≥ 1 GHz]
3.3.3.1.3 FM Accuracy: ±10% (ΔF ≥ 50 kHz); ±20% (5 ≤ ΔF < 50 kHz)
3.3.3.1.4 Distortion: ≤10% [ΔF=300 kHz @ 10 kHz]
3.3.3.1.5 Incidental AM: ≤ 0.2% (50 Hz - 15 kHz BW) [ΔF = 20 kHz @ 1 kHz]
3.3.3.2 External FM
3.3.3.2.1 Rates: At least 1 kHz to 100 kHz
3.3.3.2.2 FM Deviation:
≤ 1 kHz to at least 100 kHz peak [50 MHz ≤ F ≤ 500 MHz]
≤ 1 kHz to at least 1 MHz peak [500 MHz ≤ F ≤ 1 GHz]
≤ 1 kHz to at least 2 MHz peak [F ≥ 1 GHz]
3.3.3.2.3 FM Accuracy: ±10% (ΔF ≥ 50 kHz); ±20% (5 ≤ ΔF < 50 kHz)
3.3.3.2.4 Distortion: ≤5% [ΔF=300 kHz @ 10 kHz]

4.0 GENERAL REQUIREMENTS

4.1 Power: 115/230 Vac ±10% single phase, 50, 60 or 400 Hz, 250 watts maximum

4.2 Dimensions: The total volume shall not exceed 46,000 cm^3 (2,800 in^3).

4.3 Weight: The overall weight shall not exceed 27.3 kg (75 lb). **Is this correct calculation?**

4.4 Calibration Interval: The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.5 Remote Operation: The unit will be capable of remote operation via IEEE-488( ) bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable, and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1, DT1.